REMARKS

Claims 1, 3-33, 35-45, 47, and 49-54 remain pending in the above identified application. Claim 54 has been withdrawn. The Examiner has considered claims 6-24, 31-33, and 39-45 to be withdrawn, and claims 2, 34, 46, and 48 have been cancelled. Pending claims 1, 3-5, 25-30, 35-38, 47, and 49-53 have been rejected in the present office action. Applicants hereby traverse these rejections and respectfully submit that the amended claims overcome the Examiner's rejections.

Claim Rejections Under 35 U.S.C. 103(a)

The Examiner rejected claims 1, 3, 4, 25, 26, 35-38, 47, 49-50, and 52-53 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,683,244 to Fujimori et al. ("Fujimori"). The Examiner also rejected claim 5 under 35 U.S.C. 103(a) as unpatentable over Fujimori in view of U.S. Patent No. 6,045,626 to Yano et al. ("Yano"). The Examiner further rejected claim 46 under 35 U.S.C. 103(a) as being unpatentable over Fujimori in view of U.S. Patent No. 4,082,569 to Evans, Jr. ("Evans"). The Examiner rejected claims 1, 27-30, 47, and 52 under U.S.C. 103(a) as being unpatentable over U.S. Publication No. 2003/0178637 to Chen et al. ("Chen") in view of U.S. Patent No. 5,702,829 to Paidassi et al. ("Paidassi") and U.S. Patent No. 5,645,626 to Edlund et al. ("Edlund) where both Paidassi and Edlund were used as teaching references. Finally, the Examiner rejected claims 51 and 52 under U.S.C. 103(a) as being unpatentable over Yano. Applicants hereby traverse these rejections.

In making a rejection under 35 U.S.C. § 103(a), the Examiner must establish the three elements of a *prima facie* case of obviousness. MPEP § 2142. First, the Examiner must show that the prior art references teach all elements of the claims. Second, the Examiner must show that the prior art provides the reason or motivation to make the claimed combination. The mere fact that references can be combined does not create a *prima facie* case of obviousness.

Moreover, the motivation to combine cannot come from the applicant's own disclosure but must come from the prior art itself. Additionally, no motivation to combine references exists where doing so would render one of the prior art references unsatisfactory for its intended purpose. Third , the Examiner must prove that there is a reasonable expectation of success in combining the prior art references.

Fujimori

The Examiner rejected pending claims 1, 3-4, 25-26, 35-38, 47, 49-50, and 52-53 under 35 U.S.C. 103(a) as being unpatentable over Fujimori. Fujimori, however, fails to teach all of the elements of Applicants' amended claim 1. For example, Fujimori at least fails to teach or suggest a barrier structure having "a water vapor transmission rate . . . less than about 1 x 10^{-2} $gm/m^2/day$ when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1. Moreover, Applicants submit that the ordinary level of skill in the art does not correct this deficiency.

Fujimori discloses "a photoelectric conversion element" which contains a "short-circuit preventing means" that may include a barrier layer. *See* Fujimori, col. 1:51-67. Although Fujimori fails to describe the water vapor transmission rate of the barrier layer, it does disclose methods for forming the barrier layer. These methods include "the sol-gel method, evaporation (vacuum evaporation) method, sputtering method such as high frequency sputtering method or DC sputtering method, spray thermal decomposition method, jet molding (plasma spraying) method, CVD method or the like." *See* Fujimori, col. 13:48-55. Fujimori, however, does not disclose a method using a biased substrate during a pulsed-DC physical vapor deposition. Consequently, none of the methods disclosed by Fujimori can be used to form a barrier layer

having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1.

Moreover, the level of ordinary skill in the art cannot cure this deficiency. In relation to claim 34, the Examiner states:

> Fujimori et al. teaches the dielectric layer to be made out of TiO_2 and the Applicant's specification teaches the dielectric material to be the same, hence it would be obvious to one having skill in the art to know that the dielectric layer would have a water vapor transmission rate to be less then about 1 X 10^{-2} gm/m^2/day.

A material, however, does not have one inherent water vapor transmission rate. In fact, as noted by Applicants, the same material may have different water vapor transmission rates depending on, among other variables, the way in which the material was deposited. For example, as disclosed in Table 3 on page 44 of the present application, a 1.5 KÅ barrier layer consisting of 92% silicon and 8% aluminum has a water vapor transfer rate of 4.65 x 10^{-3} gm/m^2/day when preceded by an indium breath treatment and a water vapor transfer rate of 3.8595 x 10^{-1} gm/m^2/day when preceded by an indium tin oxide breath treatment, a difference of over two orders of magnitude. Accordingly, disclosing a barrier layer consisting of a specific material, such as TiO_2, would not make a dielectric layer having a water vapor transmission rate to be less then about 1 X 10^{-2} gm/m^2/day obvious to one skilled in the art.

Additionally, Applicants submit that the type of procedure that can be used to achieve this water vapor transfer rate would not be obvious to one skilled in the art. Specifically, Applicants submit that biasing the substrate during a pulsed DC physical vapor deposition represents a new and non-obvious advancement over the prior art. Moreover, the materials deposited by this technique exhibit new qualities that cannot be obtained using the prior art deposition techniques. For example, Applicants' technique allows for deposited materials to have a greater density, as shown by the water vapor transmission rate, than the densities obtained

using the techniques known in the art. Applicants, accordingly, submit that claim 1 is patentable over Fujimori in view of the ordinary skill in the art. Therefore, Applicants respectfully request that the Examiner withdraw this rejection and allow claim 1.

Claims 3-4, 25-26, 34-38, 47, 49-50, and 52-53 depend from and include all limitations of amended claim 1. Applicants submit that these claims are allowable over Fujimori in view of the ordinary level of skill in the art for the same reasons as claim 1. Applicants, therefore, respectfully request that the Examiner withdraw these rejections and allow claims 3-4, 25-26, 35-38, 47, 49-50, and 52-53.

Fujimori in view of Yano

The Examiner rejected claim 5 under 35 U.S.C. 103(a) as unpatentable over Fujimori in view of Yano. As discussed above, Fujimori fails to teach all of the elements of Applicants' amended claim 1, and by extension, Applicants' claim 5, which depends from claim 1. For example, Fujimori at least fails to teach or suggest a barrier structure having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1. Yano fails to cure this deficiency.

Yano teaches substrate structures having a wurtzite type thin film on a silicon substrate for use in electronic devices. *See* Yano, col. 1:4-7. According to Yano, "a buffer layer is provided on a substrate having a silicon surface before a thin film (or surface layer) of a wurtzite type compound is formed on the buffer layer." *See* Yano, col. 4:8-11. Like Fujimori, Yano also fails to describe the water vapor transfer rate of the buffer layer. Yano, however, does describe several methods for forming the different layers of the substrate structures. In addition to disclosing the use of an evaporation method to deposit the barrier layer, Yano also discloses using sputtering, metal organic vapor phase epitoxy (MOVPE), and molecular beam epitaxy

(MBE) as methods for forming the surface layer. *See* Yano, col. 16:20-28. Yano further discloses using RF magnetron sputtering to form layers in the substrate structure. *See* Yano, col. 20:57-60; col. 21:40-44; col. 22:31-35; col. 23:26-30; and col. 24:8-13. Like Fujimori, however, Yano fails to disclose a method using a biased substrate during a pulsed-DC physical vapor deposition. Consequently, none of the methods disclosed by Yano can be used to form a barrier layer having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1.

Because claim 5 depends from and includes all limitations of claim 1, Applicants submit that claim 5 is patentable over Fujimori in view of Yano. Applicants, therefore, respectfully request that the Examiner withdraw the rejection of and allow claim 5.

Fujimori in view of Evans

The Examiner rejected claim 46 under 35 U.S.C. 103(a) as unpatentable over Fujimori in view of Evans. Applicants have canceled claim 46, making this rejection moot.

Chen in view of Paidassi and in further view of Edlund

The Examiner rejected claims 1, 27-30, 47, and 52 under U.S.C. 103(a) as being unpatentable over Chen in view of Paidassi and Edlund. Chen, however, fails to teach all of the elements of Applicants' amended claim 1. For example, Chen at least fails to teach or suggest a barrier structure having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1. Neither Paidassi nor Edlund corrects this deficiency.

Chen describes "a method for integrating a compound semiconductor with a substrate of high thermal conductivity." *See* Chen, block 0002. As stated in Chen:

> A barrier layer is optionally formed on the wetting layer. The barrier layer serves the purpose of preventing the internal diffusion

> of the material of subsequent bonding layer to the wetting layer or the substrate. The barrier layer includes a material selected from a group consisting of molybdenum (Mo), platinum (Pt), tungsten (W), indium oxide, tin oxide, indium tin oxide, zinc oxide, and magnesium oxide.

See Chen, block 0025. Although failing to disclose any method for forming the barrier layer, Chen does disclose multiple methods for forming a bonding layer, including deposition, evaporation, or sputter. *See* Chen, pg. 2, block [0026]. Chen does not disclose using a biased substrate during a pulsed-DC physical vapor deposition. Consequently, none of these methods as described in Chen can be used to form a barrier layer having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1.

Paidassi fails to cure the deficiency of Chen. Paidassi discloses a multilayer material useful as an anti-erosion and anti-abrasion coating. *See* Paidassi, Abstract. Although Paidassi does not disclose depositing a barrier layer, it does disclose depositing other types of layers using a cathodic sputtering or electron beam bombardment system, preferably using reduced pressure. *See* Paidassi, col. 8:24-28. Paidassi does disclose that a voltage may be applied to the substrate during the sputtering process. *See* Paidassi, col. 11:5-10; col. 12:24-31. Paidassi, however, fails to describe a method of forming a layer using a biased substrate during a pulsed-DC physical vapor deposition. Accordingly, none of these methods as described in Paidassi can be used to form a barrier layer having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1.

Finally, Edlund fails to cure the deficiencies of Chen and Paidassi. Edlund describes a composite hydrogen-permeable inorganic membrane and a module incorporating the membrane. *See* Edlund, col. 5:23-25. Edlund does not describe the densities of the layers used to make the

hydrogen-permeable inorganic membrane, but it does disclose that some of the component layers may be deposited using "electroless or electrolytic plating, chemical vapor deposition, plasma deposition, sputtering or thermal evaporation or spraying methods." *See* Edlund, col. 11:11-16. Edlund, however, fails to describe a method of forming a layer using a biased substrate during a pulsed-DC physical vapor deposition. Accordingly, none of these methods as described in Edlund can be used to form a barrier layer having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1. Accordingly, Applicants submit that amended claim 1 is patentable over Chen, in view of Paidassi and in further view of Edlund. Applicants, therefore, respectfully request that the Examiner withdraw this rejection and allow claim 1.

Further, claims 27-30, 47, and 52 depend from and include all limitations of Applicants' amended claim 1. Applicants submit that claims 27-30, 47, and 52 are patentable over Chen, in view of Paidassi and in further view of Edlund for at least the same reasons as claim 1. Applicants, therefore, respectfully request that the Examiner withdraw the rejections of claims 27-30, 47, and 52 and allow these claims.

Yano

The Examiner rejected claims 51 and 52 under U.S.C. 103(a) as being unpatentable over Yano. As discussed above, however, Yano fails to teach all of the elements of Applicants' amended claim 1. For example, Yano at least fails to teach or suggest a barrier structure having "a water vapor transmission rate . . . less than about 1 x 10^{-2} gm/m^2/day when the barrier layer has a thickness of about 1.5 KÅ" as recited in Applicants' amended claim 1. As further discussed above, the ordinary level of skill in the art fails to cure this deficiency. Accordingly, Applicants submit that claim 1 is patentable over Yano in view of the prior art for at least this

reason. Because claims 51 and 52 depend from and include all limitations of claim 1, Applicants submit that claims 51 and 52 are also allowable over the prior art. Applicants, therefore, respectfully request that the Examiner withdraw the rejections of claims 51 and 52 and allow these claims.

Conclusion

Applicants respectfully request that this Amendment and Response to Office Action be entered by the Examiner, placing claims 1, 3-5, 25-30, 35-38, 47, and 49-53 in condition for allowance. Applicants submit that the proposed amendments of claims 1, 25-28, 30, 49-53 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were either earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicants respectfully point out that the final action by the Examiner presented some new arguments as to the application of the art against Applicants' invention. It is respectfully submitted that entering the Amendment would allow the Applicants to reply to the final rejections and place the application in condition for allowance.

Finally, Applicants submit that entry of the amendment would place the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing remarks, Applicants submit that this claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references cited against this application. Applicants therefore request the entry of this Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: August 3, 2006

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